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| 10/068,669      | 02/05/2002  | Jianming Fu          | AM-6619             | 8784             |

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| EXAMINER |
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VERSTEEG, STEVEN H

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| ART UNIT | PAPER NUMBER |
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1753

DATE MAILED: 05/15/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/068,669

Applicant(s)

FU, JIANMING

Examiner

Steven H VerSteeg

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 02 April 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-37 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 9-15 is/are allowed.
- 6) ☒ Claim(s) 1, 16, 18-20 and 22-25 is/are rejected.
- 7) ☒ Claim(s) 2-8, 17, 21 and 26-37 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 February 2002 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

### Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2-4.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Election/Restrictions*

- I. Restriction to one of the following inventions is required under 35 U.S.C. 121:
  - I. Claims 1-31, drawn to a sputter reactor, classified in class 204, subclass 192.12.
  - II. Claims 32-35, drawn to an annular cover ring, classified in class 118, subclass 723R.
  - III. Claims 36 and 37, drawn to a sputter shield, classified in class 204, subclass 298.11.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions I and II are related as mutually exclusive species in an intermediate-final product relationship. Distinctness is proven for claims in this relationship if the intermediate product is useful to make other than the final product (MPEP § 806.04(b), 3rd paragraph), and the species are patentably distinct (MPEP § 806.04(h)). In the instant case, the intermediate product is deemed to be useful as an annular cover ring for a substrate and the inventions are deemed patentably distinct since there is nothing on this record to show them to be obvious variants. Should applicant traverse on the ground that the species are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the species to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions anticipated by the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.
3. Inventions I and III are related as mutually exclusive species in an intermediate-final product relationship. Distinctness is proven for claims in this relationship if the intermediate

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product is useful to make other than the final product (MPEP § 806.04(b), 3rd paragraph), and the species are patentably distinct (MPEP § 806.04(h)). In the instant case, the intermediate product is deemed to be useful as a sputter shield for a sputtering apparatus with CVD capabilities and the inventions are deemed patentably distinct since there is nothing on this record to show them to be obvious variants. Should applicant traverse on the ground that the species are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the species to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions anticipated by the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.

4. Inventions II and III are unrelated. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different modes of operation, different functions, or different effects (MPEP § 806.04, MPEP § 808.01). In the instant case the different inventions the sputter shield and the annular shield are not disclosed as capable of use together and also, the shields have different effects because the sputter shield detachably engages the magnetic dipole ring.

5. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

6. During a telephone conversation with Charles Guenzer on April 2, 2003 a provisional election was made without traverse to prosecute the invention of Group I, claims 1-31.

Affirmation of this election must be made by applicant in replying to this Office action. Claims

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32-37 would normally be withdrawn from further consideration by the examiner, 37

CFR 1.142(b), as being drawn to a non-elected invention, but Applicant has filed a preliminary amendment following the election in which the non-elected claims have been amended so that they are now dependant upon elected claims and also have subject matter that makes the claims now a part of Group I and hence, are examined below.

### *Drawings*

7. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character "20" has been used to designate both "magnetic layer" (see page 2, line 31), "metallic bit line" (see page 3, line 3) and "magnetron sputter reactor" (see page 6, line 28). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

### *Specification*

8. The disclosure is objected to because of the following informalities: "may have be" on page 5, line 8; and the status of the application needs updated on page 7, line 1.

Appropriate correction is required.

### *Claim Objections*

9. Claims 17, 22-24, 30-35, and 37 are objected to because of the following informalities: "permanently" should be "permanent" in claim 17, line 2; "the" needs inserted before "reactor" in claim 22, line 6; "a", second occurrence, needs deleted in claim 30, line 4; "the" needs inserted before "roof" in claim 32, line 9; and "the" needs inserted before "ledge" in claim 37, line 7. Claims 23 and 24 depend from claim 22 and contain all of the limitations of claim 22.

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Therefore, claims 23 and 24 are objected to for the same reasons as claim 22. Claim 31 depends from claim 30 and contains all of the limitations of claim 30. Therefore, claim 31 is objected to for the same reasons as claim 30. Claims 33-35 depend from claim 32 and contain all of the limitations of claim 32. Therefore, claims 33-35 are objected to for the same reasons as claim 32. Appropriate correction is required.

### *Double Patenting*

10. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

11. Claims 1, 19, and 20 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 27 and 41 of copending Application No. 09/138,429. Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims of the instant application are fully claimed by the claims of the copending application.

12. The claims correspond as follows: claims 1 and 19-20 of the instant application correspond to claims 41 and 27 of the copending application.

13. For claim 1, Applicant requires a sputter reactor comprising a vacuum chamber, a target comprising a magnetizable material, a pedestal in opposition to the target, and a magnetic dipole

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ring inside the sidewalls of the chamber and outside the support surface and having an axial extent along the central axis including a plane passing through the pedestal.

14. Claim 41 of the copending application claims an apparatus with a sputtering vacuum chamber with a target comprising magnetizable material, a substrate support, and a stationary annular array of permanent magnets surrounding the outer periphery of the support and creating a magnetic field extending horizontally along the support surface.

15. For claim 19, Applicant requires a method of depositing a magnetic material with a preferred alignment on a substrate comprising providing around a substrate support surface within a deposition chamber a magnetic dipole ring producing a substantially uniform magnetic field in a first direction along the substrate support surface; placing a substrate on the support surface with a predetermined direction of the substrate aligned with the first direction of the chamber; and depositing a magnetizable material onto the substrate by sputtering (claim 20) a target.

16. Claim 27 of the copending application comprises a method of depositing a magnetic film within a sputtering chamber comprising sputtering target, placing a substrate on the pedestal, and generating a magnetic field that is substantially parallel to the surface of the substrate during sputtering.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

#### *Claim Rejections - 35 USC § 102*

17. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

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A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

18. Claim 25 are rejected under 35 U.S.C. 102(b) as being anticipated by US 5,519,373 to Miyata.

19. For claim 25, Applicant requires a magnetic dipole ring assembly comprising at least 8 permanently magnetized magnets arranged in a ring around the central axis and having respective magnetization directions lying perpendicular to the central axis and precessing by 720 degrees around the ring and an annular vacuum-tight carrier encapsulating the magnets.

20. Miyata discloses a dipole ring magnet for use in a magnetron sputtering apparatus (abstract). The ring assembly comprises at least eight magnets 101-116 that precess by 720 degrees around a ring (Figure 1). Because the ring is in a sputtering apparatus, it is enclosed in a vacuum tight carrier (Figure 3)

21. Claims 16 and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by US 5,945,008 to Kusakibaru et al. (Kusakibaru).

22. For claim 16, Applicant requires a method of sputtering a magnetic material in a sputter reactor processing vacuum chamber having a target comprising magnetizable material in opposition to a substrate support surface comprising: placing in an interior of the chamber a dipole magnetic ring producing a uniform magnetic field in a first direction along the substrate support surface; placing a substrate on the support surface; and exciting a plasma in the chamber to sputter the target and coat a surface of the substrate. For claim 18, Applicant requires the substrate support surface to be electrically floating.



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23. Kisakibaru discloses a method for plasma control (abstract) in a sputtering apparatus (col. 11, l. 16-18). The process comprises placing a magnetic dipole ring (Figure 9a) in a chamber that produces a substantially uniform magnetic field in a first direction along the substrate surface (Figure 9b), placing a substrate on a support surface (Fig. 9b), and exciting a plasma 52 in the chamber. The substrate support is not shown to be biased, therefore it is floating.

*Claim Rejections - 35 USC § 103*

24. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

25. Claims 22-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 5,945,008 to Kisakibaru et al. (Kisakibaru) in view of US 5,666,247 to Schultz.

26. For claim 22, Applicant requires a method of depositing a layer of magnetized NiFe layer comprising providing a magnetron sputter reactor having sidewalls arranged around a central axis and including a target having at least a surface portion facing an interior of the reactor comprising nickel and iron; placing a substrate onto a support surface; applying a magnetic field in a predetermined direction to the central axis at the support surface; and exciting a plasma in the sputter reactor to sputter the nickel and iron from the target onto a substrate.

27. For claim 23, Applicant requires the magnetic field to align a magnetization direction of the magnetic layer.

28. For claim 24, Applicant requires the support surface to be electrically floating.

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29. Kisakibaru is described above, but does not disclose that the material sputter deposited is NiFe.

30. Schultz discloses that when forming an MR sensor, a NiFe layer is formed by sputtering (col. 3, l. 61-66).

31. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Kisakibaru to form a NiFe layer because of the desire to form an MR sensor.

*Allowable Subject Matter*

32. Claims 9-15 are allowed.

33. Claims 2-8, 21, and 26-29 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

34. Claims 17 and 30-37 would be allowable if written to overcome the claim objection presented above.

35. The following is a statement of reasons for the indication of allowable subject matter: it is neither anticipated nor obvious over the prior art of record to have a sputter reactor as claimed by Applicant in claim 9 comprising a magnetic layer disposed in the pedestal adjacent the support surface and substantially uniformly magnetized in a predetermined direction extending along the support surface.

36. US 6,077,403 to Kobayashi discloses a sputtering apparatus (Abstract) comprising a magnetic layer in a substrate pedestal (Figure 3), but the magnets are magnetized perpendicular

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to the substrate surface, not along the support surface. Changing the magnet configuration would require hindsight.

37. It is also neither anticipated nor obvious to have a magnetron sputter reactor as claimed in claim 10 comprising a magnetic ring positioned around the pedestal and creating a magnetic field perpendicular to the central axis in a plane of the support surface.

38. Kisakibaru is described above, but the magnet ring is not around the pedestal, it is above it. Modifying Kisakibaru to provide such a limitation would require hindsight.

39. It is also neither anticipated nor obvious over the prior art of record to have a method of sputtering a magnetic material in a sputter reactor as claimed by Applicant in claim 17 wherein the magnetic dipole ring comprises at least 8 permanent magnets arranged in a circle precessing by 720 degrees around the circle and producing a substantially uniform magnetic field in a first direction along the substrate support surface.

40. Kisakibaru is described above and discloses a magnetic field along a substrate support surface. Miyata is also described above and discloses the magnet dipole ring of claim 17.

However, combining Kisakibaru with Miyata to put the dipole ring into Kisakibaru would not be obvious. There is no motivation to change Kisakibaru's magnet arrangement.

41. It is also neither anticipated nor obvious over the prior art of record to have a magnetic dipole ring assembly as claimed by Applicant in claims 26, 27, and 29 wherein the magnets have a Curie temperature of at least 200 Celsius (Claim 26) or where the carrier comprises stainless steel (claim 27), or the magnets comprise samarium and cobalt (claim 29).

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42. Miyata is described above but does not disclose the above limitations. Modifying Miyata would require hindsight as there is no teaching of the limitations other than Applicant's disclosure.

43. It is also neither anticipated nor obvious over the prior art of record to have a cover and dipole ring assembly as claimed by Applicant in claim 30 comprising a magnetic dipole ring detachably supported on the cover ring that is supportable on the pedestal to protect a portion of the pedestal from deposition.

44. Miyata is described above and has the magnet dipole ring in a certain relation to the substrate that is away from the substrate and not so close as to actually be supported on a cover ring that is supported on a pedestal to protect the pedestal from deposition. Modifying Miyata to provide such a limitation would require hindsight.

#### ***General Information***

For general status inquiries on applications not having received a first action on the merits, please contact the Technology Center 1700 receptionist at (703) 308-0661.

For inquiries involving Recovery of lost papers & cases, sending out missing papers, resetting shortened statutory periods, or for restarting the shortened statutory period for response, please contact Palestine Jenkins at (703) 308-3521.

For general inquiries such as fees, hours of operation, and employee location, please contact the Technology Center 1700 receptionist at (703) 308-0661.


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*Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Steven H VerSteeg whose telephone number is (703) 305-4473. The examiner can normally be reached on Mon - Thurs (7:30 AM - 6:00 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X Nguyen can be reached on (703) 308-3322. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

  
Steven H VerSteeg  
Primary Examiner  
Art Unit 1753

shv  
May 12, 2003